MINISTRY OF HEALTH OF THE REPUBLIC OF BELARUS
Educational Institution
BELARUSIAN STATE MEDICAL UNIVERSITY

APPROVED
by Rector of the Educational Institution «Belarusian State Medical University»
_____S.P.Rubnikovich
20.11.2024
Reg. # UD-091-104/2425/edu.

PHARMACOLOGY

Curriculum of the educational institution in the academic discipline for the specialty

7-07-0911-03 «Dentistry»

2024

Curriculum is based on the educational program «Pharmacology» for the specialty 7-07-0911-03 «Dentistry», approved 20.11.2024, registration # УД-091-104/2425/уч.; on the educational plan in the specialty 7-07-0911-03 «Dentistry», approved 15.05.2024, registration # № 7-07-0911-03/2425/mf.

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RECOMMENDED FOR APPROVAL:

by the Department of Pharmacology of the Educational Institution «Belarusian State Medical University»
(protocol # 1 of 28.08.2024);

by the Scientific and Methodological Council of the Educational Institution «Belarusian State Medical University»
(protocol # 3 of 20.11.2024)

EXPLANATORY NOTE

«Pharmacology» is an academic discipline of the Medical and Biological Module # 2, containing systematized scientific knowledge about medicines, their properties and application.

The aim of the academic discipline «Pharmacology» is to develop basic professional competence for the treatment and prevention of various diseases and the correction of pathological conditions of the human body.

The objectives of the academic discipline «Pharmacology» are to develop students' scientific knowledge about:

principles, quantitative patterns and mechanisms of action of drugs at various levels of biological organization: molecular, cellular, organ, systemic;

pharmacokinetics of drugs in the human body: processes of absorption, distribution, biotransformation, excretion;

principles of rational dosing of drugs, including the choice of dosage form, route of administration and dosage regimen;

the main pharmacological effects that ensure the therapeutic effect of drugs, indications and contraindications for their use, issues of drug interactions, principles of their combined use;

the nature and manifestations of side and toxic effects of drugs, as well as ways to minimize the negative consequences of their use;

rules for writing a doctor's prescription and prescribing medications in various dosage forms;

skills and abilities necessary for:

the use of medicines for the purpose of providing first aid in case of accidents, injuries, bleeding, poisoning and other conditions that threaten human life and health;

selection and correct prescription (dosage) of drugs in the treatment and prevention of diseases and pathological conditions of the human body.

The knowledge, skills and abilities acquired in the study of the academic discipline «Pharmacology» are necessary for the successful study of the following academic disciplines: «Internal Medicine», «Pediatrics», modules: «General Clinical Therapeutic Module 2», «General Clinical Surgical Module», «Therapeutic Dentistry», «Periodontology», «Oral and Maxillofacial Surgery Module», «Pediatric Dentistry».

A student who has mastered the content of the educational material of the academic discipline should have the following basic professional competence: use knowledge about the pharmacological properties of medicines, to possess the principles of choosing rational pharmacotherapy for dental diseases and for preventive purposes.

As a result of studying the academic discipline «Pharmacology», the student should:

know:

nomenclature of medicinal products;

legal, economic, organizational and deontological aspects of the use of medicines;

the basics of pharmacokinetics and pharmacodynamics of drugs, as well as the specifics of drug use depending on the patient’s age;

pharmacological properties and principles of clinical use of drugs;

conditions and restrictions on the use of painkillers, methods of combating drug addiction;

features of the use of drugs in dentistry;

rules for clinical testing and registration of new drugs;

rules of medical ethics and deontology;

be able to:

select the route of administration of the drug and its dosage regimen based on the goals of pharmacotherapy, pharmacokinetic data of the drug and the clinical characteristics of the patient;

work with reference guides on medicines;

master:

principles for calculating individual dosage regimens for drugs based on pharmacokinetic data and individual characteristics of the patient's body;

skills in writing a doctor's prescription and creating an electronic doctor's prescription when prescribing medications in various dosage forms.

Total number of hours for the study of the discipline is 138 academic hours, of which 93 classroom hours and 45 hours of student independent work. Classroom hours according to the types of studies: lectures – 21 hours (including 6 hours of supervised student independent work (SSIW)), practical classes – 72 hours.

Intermediate assessment is carried out in accordance to the syllabus of the specialty in the form of examination (5th semester).

Form of higher education – full-time.

ALLOCATION OF ACADEMIC TIME ACCORDING TO SEMESTERS OF STUDY

Code, name specialties	Semester	Number of hours of classes						Form of intermediate assessment
		total	in-class	including			out-of-class self-studies	
				lectures	supervised student independent work	practical classes		
7-07-0911-03 «Dentistry»	4	72	48	9	3	36	24	-
	5	66	45	6	3	36	21	examination
Total hours		**138**	**93**	**15**	**6**	**72**	**45**	

THEMATIC PLAN

Section (Topic) name	Number of class hours	
	lectures (incl. SSIW)	practical
1. Introduction to the academic discipline «Pharmacology». Sources and stages of creation of medicines. Legislation in the field of medicines	**-**	**1**
2. Rules for issuing doctor's prescriptions when prescribing medicines in various dosage forms	**-**	**5**
3. Pharmacokinetics of drugs	**1,5**	**4**
4. Pharmacodynamics of drugs	**1,5**	**2**
5. Drugs affecting the peripheral nervous system	**3**	**10**
5.1. Cholinergic drugs	1,5	4
5.2. Adrenergic drugs	-	4
5.3. Agents affecting afferent transmission of nerve impulses	1,5	2
6. Drugs affecting the central nervous system	**3**	**10**
6.1. General anesthetics. Ethyl alcohol	-	2
6.2. Analgesics	1,5	2
6.3. Anticonvulsants and antiparkinsonian drugs	-	2
6.4. Psychotropic drugs	1,5	4
7. Drugs affecting the functions of executive organs and systems	**1,5**	**14**
7.1. Drugs affecting respiratory system	-	2
7.2. Drugs affecting the functions of the digestive organs. Agents affecting the tone and contractile activity of the myometrium	-	2
7.3. Drugs affecting the blood system	-	2
7.4. Drugs affecting the cardiovascular system and renal function	1,5	8
8. Agents regulating tissue metabolism	**3**	**6**
8.1. Hormonal and antihormonal agents	-	2
8.2. Anti-inflammatory drugs	1,5	2
8.3. Antiallergic agents and immunomodulators. Vitamins and vitamin-like agents. Salts of alkaline and alkaline earth metals	1,5	2
9. Chemotherapeutic agents	**4,5**	**12**
9.1. Chemotherapy of infections. Antibiotics	1,5	6
9.2. Synthetic antimicrobial agents. Antimycobacterial agents	1,5	2
9.3. Antiviral agents. Antifungal agents	1,5	2
9.4. Antiseptic and disinfectant agents. Antiprotozoal and antiparasitic agents. Anti-tumor agents	-	2
10. Drugs used in dentistry	**3**	**4**
10.1. Agents regulating metabolism in hard dental tissues	1,5	2
10.2. Agents used to affect the oral mucosa and dental pulp	1,5	2
11. Drug interactions. Pharmacogenetics	**-**	**2**
12. Principles of treatment of acute drug poisoning	**-**	**2**
Total hours	**21**	**72**

CONTENT OF THE EDUCATIONAL DISCIPLINE

1. Introduction to the academic discipline «Pharmacology». Sources and stages of creation of medicines. Legislation in the field of medicines

The concept of treatment, the main treatment factors and methods of treatment. The essence of pharmacology as a science of managing the processes of human life with the help of chemicals. The purpose and objectives of pharmacology. Historical stages of the development of pharmacology as a science, the contribution of domestic scientists to the development of pharmacology. Sections and areas of pharmacology. Clinical pharmacology. Pharmacy.

The concept of a medicinal substance, medicinal product, medicinal preparation, dosage form. Nomenclature of medicinal products. Sources of medicinal substances, stages of development and testing of medicinal products. Benefits and risks of using medicinal products. Bioethical and deontological problems of pharmacology and pharmacotherapy. The Helsinki Declaration of the World Medical Association, ethical principles for conducting medical research involving humans as subjects. Control of authorized bodies and organizations over the circulation of medicinal products. Legislation in the field of circulation of medicinal products.

2. Rules for issuing doctor's prescriptions when prescribing medicines in various dosage forms

The concept of a medicinal substance, medicinal product, medicinal preparation, medicinal form. Sources of obtaining medicinal substances. State Pharmacopoeia, its contents and purpose. International Pharmacopoeia. Pharmacy. Rules for storing and dispensing medicines. Prescription and its structure. Rules for writing prescriptions. Features of prescribing narcotic, poisonous and potent substances.

Solid dosage forms: powders, tablets, dragees, capsules. Their characteristics, advantages and disadvantages. Rules for prescribing.

Liquid dosage forms. General characteristics and rules for prescribing liquid dosage forms. Dosage. Solutions for external use and oral administration. Solvents. Official solutions. Suspensions. Liquid dosage forms obtained from herbal medicinal raw materials: infusions, decoctions, collections, galenic and neogalenic preparations, mucus, emulsions, liniments. Mixtures.

General characteristics and requirements for injection dosage forms. Rules for prescribing factory-made and pharmacy-made injection forms.

Soft dosage forms: ointments, pastes. Ointment bases. Rules for preparation and prescription. Dosed soft dosage forms – suppositories. Rules for prescription.

Special dosage forms – therapeutic systems (oral, transdermal, parenteral); dosage forms for children.

3. Pharmacokinetics of drugs

Transfer of medicinal substances in the human body: absorption, distribution, metabolism, excretion. Movement of medicinal substances through biological barriers: aqueous diffusion, diffusion in lipids, transfer of substances through membranes with variable ionization, active transfer of substances. Transfer determinants.

Routes of administration of drugs into the human body, their purposes, advantages, disadvantages. Presystemic elimination of drugs. Distribution of drugs in the human body (water spaces and cellular compartments), distribution rate.

Main pharmacokinetic parameters: bioavailability, distribution volume, clearance, half-life, elimination constant; their essence, principles of calculation and quantitative expression, dimensionality, interrelation, clinical significance.

Dosage goals and variables of medicinal products: dose, types of doses, routes and intervals of administration. Introductory (loading, bolus) dose: therapeutic meaning, calculation of individual loading dose based on pharmacokinetic parameters. Conditions and limitations of using loading doses. Maintenance doses: therapeutic meaning, calculation of maintenance doses to ensure optimal dosing regimen.

Introduction of drugs into the bloodstream at a constant rate. Kinetics of drug concentration in the blood and its dependence on pharmacokinetic parameters, solution concentration and rate of administration. Steady-state equilibrium concentration of drug in the blood (C_{SS}), time to achieve it, calculation and management of C_{SS}.

Intermittent (discrete) dosing: fluctuations in the concentration of a drug in the blood, therapeutic and toxic ranges of concentrations. Calculation of the C_{SS} of a drug and the limits of its fluctuations (minimum (C_{SSmin}) and maximum (C_{SSmax})) during discrete dosing of drugs, control of the concentration of a drug. Adequate interval for administration of discrete doses.

The necessity of biotransformation of drugs and its biological meaning, main focus, tissue localization. The influence of biotransformation on the activity of drugs. Phases of metabolic transformations of drugs. Clinical significance of biotransformation of drugs; diseases affecting their biotransformation.

Clearance as the main determinant of pharmacokinetics. Renal clearance of drugs and its components: filtration, active secretion, reabsorption. Factors affecting renal clearance. Clearance of drugs by the liver – metabolic transformation and secretion into bile. The main properties of substances excreted with bile. Factors modifying clearance of drugs.

4. Pharmacodynamics of drugs

The nature of the biological action of chemicals. The concept of receptors in pharmacology. Chemical and physicochemical determinants of the pharmacological activity of drugs, affinity and intrinsic activity of drugs. Interaction of drugs with targets: receptor agonism (complete, partial, inverse), receptor antagonism (competitive, non-competitive), non-specific mechanisms of drug action. Terms and concepts of quantitative pharmacology – effect, efficiency, activity. Quantitative laws of drug action. The law of decreasing response of biological systems. General form of the dose-effect relationship in normal and lognormal coordinates.

Types of drug action. Pharmacodynamic action and placebo effect. Types of pharmacotherapy. Therapeutic range of drugs. Methods for assessing the effect of drugs (gradual, quantum), their essence and clinical applications. Variability and changeability of drug action. Hyporeactivity, hyperreactivity, hypersensitivity, idiosyncrasy. Tolerance and its special cases (tachyphylaxis, mithridatism). Cumulation. Causes and consequences of variability of drug action. Drug dependence.

Types of doses: minimum, average and highest therapeutic doses, single, daily and course doses, introductory and maintenance doses, toxic doses. Evaluation of drug safety. Therapeutic index and standard safety limits.

Factors providing therapeutic, side and toxic effects of drugs. Polytropism and pleiotropy of drugs, clinical significance. Effect of drugs on the fetus and the course of pregnancy, the concept of embryotoxic, teratogenic, fetotoxic action. Therapeutic strategy for combating side and toxic effects of drugs.

Interaction of drugs, its types. Synergism of drugs, addition and potentiation of effects. Synergistic combinations of drugs as the basis of modern pharmacotherapy. Antagonism of drugs, its types and clinical significance.

5. Drugs affecting the peripheral nervous system

5.1. Cholinergic drugs

General scheme of the structure, neurotransmitters and receptors of the peripheral (somatic and autonomic) nervous system. Cholinergic signal transmission. The structure of cholinergic synapses and the mechanism of transmission of nerve impulses. The mechanism of acetylcholine release and its regulation. Molecular structure and heterogeneity of cholinergic receptors: muscarinic (M_1, M_2, M_3, M_4) and nicotinic cholinergic receptors (N_m, N_n). Localization and effects of physiological and pharmacological stimulation. Classification of cholinergic drugs.

Cholinergic agonists (cholinomimetic agents)

M-cholinomimetics (pilocarpine, civemelin). Effect on the eye, smooth muscles of internal organs, secretion of glands, cardiovascular system. Application.

M, N-cholinomimetics (acetylcholine chloride); pharmacological effects.

H-cholinomimetics (nicotine, lobeline, varenicline). Effects of stimulation of H-cholinoreceptors of the carotid sinus area, chromaffin cells of the adrenal medulla. Nicotinism. Use of nicotinomimetics to combat smoking.

Anticholinesterase agents. Reversible cholinesterase inhibitors: physostigmine, neostigmine. Irreversible cholinesterase inhibitors (organophosphorus compounds). Main effects, side and toxic effects of anticholinesterase agents; treatment of poisoning: cholinesterase reactivators (pralidoxime mesylate), anticholinergics (atropine sulfate). Acetylcholine release stimulants (itopride).

Anticholinergic agents

Agents that inhibit the release of acetylcholine (botulinum toxin A); use, side effects.

M-anticholinergics: atropine sulfate, dicycloverine, hyoscine hydrobromide, ipratropium bromide, pirenzepine, oxybutynin, tolterodine, darifenacin. Effect of M-anticholinergics on the eye, smooth muscles of internal organs, secretion of glands, cardiovascular and central nervous system. Comparative characteristics of drugs. Application. Help with poisoning with M-anticholinergics.

Ganglionic blockers (N_N-anticholinergics): trimethaphan, hexamethonium benzosulfonate. Main effects, indications for use, side effects.

Neuromuscular blocking agents (N_M-anticholinergics): pipecuronium bromide, atracurium, suxamethonium chloride. Classification, mechanisms of muscle relaxant action, use, side effects, pharmacological antagonists.

Central anticholinergics: trihexyphenidyl, biperiden: pharmacological effects. Application.

5.2. Adrenergic drugs

Adrenergic signal transmission. Structure of adrenergic synapses and mechanism of nerve impulse transmission. Regulation of mediator release and their metabolism. Heterogeneity of adrenoreceptors (α and β-adrenoreceptors): localization, effects of physiological and pharmacological stimulation.

Adrenergic agonists (adrenergic agonists)

α-Adrenergic agents: α_1 -adrenergic agents – phenylephrine; agents with α_2 -adrenergic component of action – clonidine; α_1, α_2 -adrenergic agents (relatively selective α_2 -adrenergic agents) – xylometazoline, naphazoline.

β-Adrenergic agonists: β_1 -adrenergic agonists – dobutamine; β_2 -adrenergic agonists – salbutamol, salmeterol, terbutaline; β_1 ,β_2, β_3 -adrenergic agonists (non-selective) – isoprenaline.

α- and β-adrenergic agonists: epinephrine, norepinephrine, dopamine.

Adrenergic blocking agents

α-Adrenergic blockers: α_1 -adrenergic blockers – doxazosin, prazosin, tamsulosin; α_2 -adrenergic blockers – yohimbine; α_1, α_2 -adrenergic blockers (non-selective) – phentolamine, dihydroergotamine.

β-Adrenergic blockers: β_1, β_2, -adrenergic blockers (non-selective) - propranolol, nadolol, sotalol; β_1 -adrenergic blockers (cardioselective) - metoprolol, atenolol.

α- and β-Adrenergic blockers: carvedilol, labetalol

Pharmacological effects of adrenomimetics and adrenoblockers of various groups, use, side and toxic effects.

Presynaptic agents

Sympathomimetics (ephedrine) and sympatholytics (guanethidine); main effects, application.

5.3. Agents affecting afferent transmission of nerve impulses

Local anesthetics: procaine, lidocaine, bupivacaine, articaine, tetracaine, bumecaine, ropivacaine, benzocaine. Classification, mechanism of action. Comparative characteristics of drugs by strength and duration of action. Use of local anesthetics for different types of anesthesia (infiltration, conduction, superficial); selection of drugs for intraligamentary and intrapulpal anesthesia, drugs for pain relief of hard dental tissues. Use of adrenomimetics (epinephrine) to prolong anesthesia. Change in the activity of anesthetics when administered into inflamed tissue. Toxic effect of local anesthetics, measures to prevent it.

Astringent (tannin, zinc oxide), enveloping (mucus, sucralfate), adsorbent (activated carbon), irritant (menthol, ammonia solution) agents. Principles of action, application.

6. Drugs affecting the central nervous system

6.1. General anesthetics. Ethyl alcohol

Definition of the term «anesthesia». Inhalation and non-inhalation anesthesia. Stages of anesthesia. Requirements for an ideal drug for general anesthesia (GA). The concept of the activity of inhalation GA (minimum alveolar concentration). Molecular and neurophysiological mechanisms of GA action.

Inhalation GA: isoflurane, sevoflurane, halothane, dinitrogen oxide (nitrous oxide).

Non-inhalation GA: sodium thiopental, propofol, ketamine.

Clinical use of GA, types of anesthesia, concept of the breadth of narcotic action, side effects.

Ethyl alcohol. Local and resorptive action of ethyl alcohol; application in medicine. Acute poisoning with ethyl alcohol and principles of its pharmacotherapy. Chronic poisoning with ethyl alcohol (alcoholism). Principles and means of treating alcoholism: disulfiram, apomorphine.

6.2. Analgesics

Concepts of the systems of perception and regulation of pain in the human body. Nociceptive system, specific and nonspecific pathways of pain sensation; pain mediators. Antinociceptive system, mediators of the antinociceptive system and their precursors. Opiate receptors – localization, heterogeneity (μ-, κ-, δ-, σ-), activation effects.

Narcotic analgesics (opioids) and their antagonists

Opioid receptor agonists: morphine, codeine, dihydrocodeine, trimeperidine, fentanyl, methadone.

Opioid receptor agonists-antagonists (pentazocine) and partial agonists (buprenorphine).

Opioid antagonists: naloxone, naltrexone.

Molecular and cellular mechanisms of action, main pharmacological effects. Pharmacokinetics of opioids. Main groups of opioids and their characteristics.

Areas of medical application of narcotic analgesics. Side and toxic effects. Acute opioid poisoning and principles of its pharmacotherapy. Chronic toxicity and drug dependence. Principles of pharmacotherapy of drug addiction and withdrawal syndrome. Drug interactions of opioids.

Non-narcotic analgesics

Centrally acting analgesics – nefopam, paracetamol; cyclooxygenase inhibitors in peripheral tissues and the central nervous system – ibuprofen, ketorolac, acetylsalicylic acid, combination agents.

Mixed action analgesics (tramadol)

Mechanisms of analgesic and antipyretic action. Application, side effects, contraindications. Comparative characteristics of non-narcotic and narcotic analgesics. The concept of neuroleptanalgesia.

Agents used in neuropathic pain syndromes

Principles of migraine pharmacotherapy. Drugs for relief of acute attacks: acetylsalicylic acid, paracetamol, $5HT_1$ -receptor agonists (sumatriptan), ergot alkaloids (ergotamine), antiemetics (metoclopramide). Drugs for prevention of migraine attacks: pizotifen, erenumab, β-adrenoblockers, tricyclic antidepressants, Ca^{2+} channel blockers , cyproheptadine.

Agents for the treatment of acute and chronic pain syndromes (adjuvants): clonidine, amitriptyline, carbamazepine, gabapentin, corticosteroids, baclofen, diphenhydramine. Mechanisms of analgesic action, application.

6.3. Anticonvulsants and antiparkinsonian drugs

Anticonvulsants (antiepileptics): valproic acid, carbamazepine, phenytoin, gabapentin, ethosuximide, phenobarbital. Mechanisms of action, use, side effects.

Antispastic agents : tizanidine, baclofen.

Antiparkinsonian drugs: levodopa, selegiline, pramipexole, trihexyphenidyl. Use of DOPA decarboxylase inhibitors (carbidopa, benserazide) and COMT inhibitors (entacapone) to reduce side effects and increase the effectiveness of levodopa. Principles of drug correction of extrapyramidal disorders.

6.4. Psychotropic drugs

Anxiolytics (tranquilizers) and sedative-hypnogenic agents

Anxiolytic, sedative and hypnogenic effects - essence, similarities and differences. Chemical classes and pharmacological groups of drugs used in psychoneurotic disorders and sleep disorders.

Anxiolytics: alprazolam, diazepam, oxazepam, chlordiazepoxide, buspirone hydrochloride.

Sedatives (calming agents): herbal preparations (valerian, motherwort); bromides (sodium bromide); combination drugs (corvalol).

Hypnogenic (sleeping pills) drugs: triazolam, nitrazepam, zaleplon, zopiclone, zolpidem, chloral hydrate.

Means for correcting circadian rhythm disorders (melatonin).

Neurophysiological and molecular mechanisms of action of anxiolytic and sedative-hypnogenic agents. Pharmacological, side and toxic effects. Areas of application of anxiolytics and sedative-hypnogenic agents, limitations of their use. Acute benzodiazepine poisoning, benzodiazepine antagonist (flumazenil).

Antipsychotics (neuroleptics)

Neuroleptics as a special class of psychopharmacological agents. The concept of neuroplegia. Antipsychotic agents:

first generation: chlorpromazine, flupentixol, haloperidol, droperidol;

second generation (atypical antipsychotics): clozapine, risperidone, aripiprazole.

Neurophysiological effects and mechanisms of antipsychotic action. Principles of application. Side and toxic effects (effects on the central nervous system, autonomic functions, endocrine system).

Antidepressants (thymoanaleptics)

Tricyclic antidepressants: imipramine, amitriptyline, venlafaxine.

Selective neuronal serotonin reuptake inhibitors: fluoxetine, sertraline, vortioxetine.

Atypical antidepressants: mianserin, tianeptine, trazadone.

Monoamine oxidase inhibitors (moclobemide).

Medical use, side effects.

Normothymic (antimanic) agents

Lithium salts – lithium carbonate, etc. Mechanism of action, application, side effects.

Nootropic, psychostimulant, analeptic drugs

Nootropic agents: piracetam, vinpocetine, nimodipine, donepezil hydrochloride, memantine.

Psychostimulants: caffeine, mesocarb.

Analeptics: nikethamide, doxapram hydrochloride, caffeine sodium benzoate.

Pharmacological effects, use, side effects of nootropic, psychostimulant, analeptic drugs.

7. Drugs affecting the functions of executive organs and systems

7.1. Drugs affecting respiratory system

Drugs for the treatment of bronchial asthma and relief of bronchospasm: β-adrenergic agonists (salbutamol, terbutaline, salmeterol), glucocorticosteroids (beclomethasone, budesonide), inhibitors of the release of allergy mediators (cromoglycic acid, ketotifen), M-anticholinergics (ipratropium bromide), leukotriene receptor antagonists (montelukast), phosphodiesterase inhibitors (aminophylline). Selection of a drug for the relief of asthma attacks or their prevention.

Respiratory stimulants: almitrine (peripheral respiratory analeptic); doxapram, nikethamide, ethimizole, bemegride (respiratory center stimulants).

Surfactants: colfosceril palmitate, poractant alpha and stimulators of their synthesis (ambroxol). Routes of administration.

Expectorants and mucolytics: medicines based on thermopsis, potassium iodide, ambroxol, acetylcysteine, dornase alpha.

Antitussives: codeine phosphate, dextromethorphan, prenoxdiazine.

Principles of action of drugs of various groups, application, side effects.

Drugs used in the treatment of pulmonary edema: morphine, furosemide, mannitol, sodium nitroprusside, azamethonium, aminophylline, ethyl alcohol. Principles of pharmacotherapy of pulmonary edema. Effect of ethyl alcohol, oxygen therapy.

7.2. Drugs affecting the functions of the digestive organs. Agents affecting the tone and contractile activity of the myometrium

Medicines used to treat gastric and duodenal ulcers

Antacids and simethicone: calcium carbonate, magnesium hydroxide, aluminum phosphate and their combinations, sodium bicarbonate, simethicone containing antacids.

Proton pump blockers: omeprazole, lansoprazole, rabeprazole. Vonoprazole.

H_2-receptor blockers: cimetidine, famotidine, ranitidine.

Selective M_1-anticholinergics (pirenzepine).

Gastrin receptor blockers (proglumide).

Agents that have a protective effect on the mucous membrane of the stomach and intestines (gastroprotectors): bismuth tripotassium dicitrate, sucralfate, misoprostol.

Helicobacter pylori eradication agents: proton pump inhibitors, clarithromycin, amoxicillin, bismuth preparations, metronidazole, levofloxacin.

Drugs that affect the tone and motility of the gastrointestinal tract

Motility inhibitors: anticholinergics (dicycloverine, atropine sulfate); myotropic and mixed action antispasmodics (drotaverine, pinaverium bromide).

Antidiarrheal agents: opiate receptor agonists (loperamide); adsorbents and astringents.

Motility stimulants: cholinomimetics (pyridostigmine bromide), dopamine receptor antagonists (metoclopramide, domperidone, itopride).

Laxatives: senna preparations, bisacodyl, magnesium sulfate, lactulose, methylcellulose, vaseline oil. Localization of action and speed of onset of laxative effect. Indications and contraindications for the use of laxatives.

Emetics (apomorphine).

Antiemetics: ondansetron, palonosetron, metoclopramide, domperidone, promethazine, hyoscine hydrobromide, dexamethasone, nabilone, aprepitant. The choice of drug depends on the cause and mechanism of vomiting.

Hepatotropic agents

Choleretic agents: dehydrocholic acid, osalmide, magnesium sulfate, drotaverine, M-anticholinergics, herbal preparations.

Cholelithiatic agents (ursodeoxycholic acid).

Hepatoprotectors: betaine, ademetionine, silibinin, ursodeoxycholic acid, essential phospholipids.

Agents affecting pancreatic function: diluted hydrochloric acid, pancreatin, cholecystokinin, M-anticholinergics, proteinase inhibitors (aprotinin). Principles of pharmacotherapy of acute and chronic pancreatitis.

Agents that affect appetite and digestion processes

Antianorectic agents (appetite stimulants): tincture of wormwood, cyproheptadine.

Anorexigenic agents: phenylpropanolamine, dexfenfluramine. Limitations and dangers of use, side effects of anorexigenic agents.

Agents that improve digestion processes: pepsin, tilactase, diluted hydrochloric acid.

Antiobesity agents: anorexigenic agents, intestinal lipase inhibitors (orlistat), agents that create a satiety effect (methylcellulose), hypoglycemic agents (metformin, acarbose).

Agents that affect the tone and contractile activity of the myometrium

Agents for enhancing labor activity (oxytocin, prostaglandins – dinoprost, dinoprostone); agents for stopping uterine bleeding (ergot preparations, oxytocin), agents that reduce the tone of the myometrium (hexoprenaline). Principles of action, application.

7.3. Drugs affecting the blood system

Drugs affecting hematopoiesis

Medicines used for anemia: medicines containing iron, cyanocobalamin, folic acid, epoetin alpha.

Causes of anemia, principles of pharmacotherapy of anemia. Poisoning with drugs containing iron, antidotes (deferoxamine).

Agents that stimulate leukopoiesis (molgramostim, filgrastim).

Drugs that suppress hematopoiesis (antineoplastic agents).

Drugs affecting hemostasis. Classification of drugs regulating hemostasis, principles and mechanisms of action, main indications for use, complications. Principles of treatment and prevention of acute arterial and venous thromboses.

Antiplatelet agents (antiplatelet agents): acetylsalicylic acid, clopidogrel, dazoxibenz, prasugrel, pentoxifylline, abciximab.

Anticoagulants: sodium heparin, calcium nadroparin, antithrombin III, danaparoid sodium, dabigatran etexilate, fondaparinux, rivaroxaban, warfarin.

Thrombolytic agents: fibrinolysin, streptokinase, alteplase.

Hemostatic agents: blood clotting factor preparations, eltrombopag, phytomenadione, calcium salts, tranexamic acid, thrombin.

7.4. Drugs affecting the cardiovascular system and renal function

Diuretics: hydrochlorothiazide, ndapamide, furosemide, spironolactone, eplerenone, triamterene, mannitol, acetazolamide. Classification. Mechanisms of diuretic action, rate of onset and duration of effect. Effect of diuretics on ion balance. Use, side effects.

Antihypertensive drugs

Main groups of antihypertensive drugs:

diuretics: hydrochlorothiazide, indapamide, furosemide, spironolactone, eplerenone, triamterene;

renin-angiotensin-aldosterone system (RAAS) inhibitors: aliskiren, captopril, enalapril, lisinopril, losartan, candesartan;

centrally acting sympathoplegic agents (clonidine, methyldopa, moxonidine);

β-blockers: propranolol, metoprolol, atenolol, nebivolol;

α_1-adrenergic blockers (doxazosin);

calcium channel blockers: nifedipine and its retard forms, amlodipine;

vasodilators (diazoxide, sodium nitroprusside);

sympatholytics (guanethidine).

Principles of pharmacotherapy of arterial hypertension. Differences in pharmacotherapeutic approaches to the treatment of arterial hypertension and the relief of hypertensive crises.

Antianginal drugs

The main groups of antianginal drugs:

β-adrenergic blockers: propranolol, atenolol, metoprolol;

calcium channel blockers: diltiazem, verapamil, nifedipine and its retard forms, amlodipine;

organic nitrates and nitrate-like agents: nitroglycerin, isosorbide dinitrate, molsidomine. Tolerance to nitrates.

Principles of action of antianginal drugs. Selection of drugs for relief and prevention of angina attacks.

Hypolipidemic agents: statins (atorvastatin), ezetimibe, nicotinic acid, fibrates (gemfibrozil), bile acid sequestrants (colestyramine). Principles of action, clinical use.

Medicines for the treatment of heart failure

The main drugs used to treat heart failure are:

RAAS inhibitors: captopril, enalapril, losartan, sacubitril/valsartan;

β-adrenergic blockers: metoprolol, bisoprolol, carvedilol;

diuretics: hydrochlorothiazide, indapamide, furosemide;

aldosterone antagonists: spironolactone, eplerenone, finerenone;

and notropic agents:

cardiac glycosides (digoxin): effect on the contractile and bioelectric functions of the heart, the essence of the therapeutic effect in cardiac decompensation, side and toxic effects (arrhythmogenic, effects on the gastrointestinal tract, neurotoxic effects), use, possible causes of digitalis intoxication;

other inotropic agents (non-glycoside): dopamine, dobutamine, milrinone, levosimendan. Mechanisms of inotropic action, areas of application.

Supportive agents: peripheral vasodilators, antihypoxants.

Antiarrhythmic drugs

Classification of antiarrhythmic drugs (AAD) based on electrophysiological and pharmacological effects on the myocardium.

AAD used for tachyarrhythmias: membrane-stabilizing Na^+ -channel blockers (procainamide, lidocaine, propafenone), β- adrenergic blockers (propranolol, metoprolol), K^+ -channel blockers (amiodarone, sotalol), Ca^{2+} -channel blockers (verapamil), purinergic receptor agonists (adenosine).

AAD used for bradyarrhythmia: M-anticholinergics, β-adrenergic agonists.

Main mechanisms of antiarrhythmic action. Areas of application of AAD, side effects.

8. Agents regulating tissue metabolism

8.1. Hormonal and antihormonal agents

Preparations of hormones of the hypothalamus and pituitary gland

Hypothalamic hormone preparations: octreotide, gonadorelin, goserelin, protirelin.

Preparations of hormones of the anterior pituitary gland: somatropin, gonadotropins (urofollitropin, human chorionic gonadotropin, lutropin alpha, menotropins), thyrotropin.

Preparations of hormones of the posterior pituitary gland: oxytocin, desmopressin, terlipressin.

The influence of hypothalamic and pituitary drugs on hormonal status, pharmacological effects, application.

Thyroid and antithyroid agents

Thyroid hormone preparations: sodium levothyroxine (T4), liothyronine (T3). Therapeutic use.

Antithyroid drugs: thiamazole, propylthiouracil, iodides, radioactive iodine; β-blockers (propranolol). Mechanisms of action, use, side effects and complications.

Hormonal regulators of mineral homeostasis and other drugs that affect bone tissue metabolism

Parathyroid hormone preparations (teriparatide). Effect on phosphorus and calcium metabolism. Application.

Antiparathyroid agents (caltitonin, paricalcitol). Bisphosphonates (sodium alendronate, zoledronic acid). Vitamin D and analogues (alfacalcidol, paricalcitol). Mechanism of action. Application in medical practice.

Pancreatic hormone preparations and synthetic antidiabetic agents

Short-acting and prolonged-action insulin preparations. The effect of insulin on metabolism. Routes of insulin administration, complications of insulin therapy.

Oral hypoglycemic agents: glibenclamide, metformin. Mechanism of action, indications for use, side effects. Other antidiabetic agents: increasing tissue sensitivity to insulin (pioglitazone), stimulating insulin release (repaglinide), inhibiting carbohydrate absorption from the intestine (acarbose), incretin mimetics (liraglutide, vildagliptin), renal glucose reabsorption inhibitors (empagliflozin), amylin analogues (pramlintide).

Insulin antagonists: glucagon, epinephrine hydrochloride, glucocorticosteroids. Mechanisms of action, application.

Preparations of adrenal cortex hormones

Glucocorticosteroids (GCS): hydrocortisone, methylprednisolone, prednisolone, triamcinolone, dexamethasone, betamethasone, fluocinolone acetonide.

The effect of GCS on metabolism in the human body. Anti-inflammatory and anti-allergic properties of GCS. Therapeutic use, side effects. Synthetic GCS for local use.

Mineralocorticoids: deoxycortone, fludrocortisone. Biological action and use of mineralocorticoids.

Corticosteroid synthesis inhibitors (aminoglutethimide).

Preparations of female sex hormones

Estrogen drugs: estradiol, ethinyl estradiol, hexestrol.

Progestogens: progesterone, dydrogesterone.

Chemical structure and physiological significance of estrogens and gestagens, therapeutic use.

Estrogen and progestin antagonists: tamoxifen, mifepristone. Use in medicine.

Contraceptives (contraceptives): combined oral contraceptives (Marvelon, Anteovin, Tri-Regol), norethisterone, levonorgestrel. Principles of action, side effects.

Male sex hormone preparations, anabolic steroids

Androgenic drugs (testosterone and its esters). Pharmacological activity. Indications for use, side effects.

Antiandrogen drugs (finasteride, flutamide). Use in medicine.

Anabolic steroids (nandrolone). Effect of anabolic steroids on metabolic processes. Application, side effects.

8.2. Anti-inflammatory agents

GCS: prednisolone, methylprednisolone, triamcinolone, dexamethasone, betamethasone.

Nonsteroidal anti-inflammatory drugs (NSAIDs): acetylsalicylic acid, indomethacin, ibuprofen, ketoprofen, ketorolac, diclofenac, meloxicam, nimesulide, celecoxib, etoricoxib.

Mechanisms of anti-inflammatory action. Indications and contraindications for use. Side effects, their prevention.

Antigout agents: uric acid synthesis inhibitors (allopurinol, febuxostat), uricosuric agents (sulfinpyrazone, probenecid), pegloticase; agents used in acute gout attacks: NSAIDs, GCS, colchicine. Mechanisms of action, use, side effects.

8.3. Antiallergic agents and immunomodulators. Vitamins and vitamin-like agents. Salts of alkaline and alkaline earth metals

Medicines used for immediate allergic reactions

Antihistamines (H_1-histamine receptor blockers): diphenhydramine, clemastine, loratadine, cetirizine.

Mast cell membrane stabilizers (cromoglycic acid).

GCS: prednisolone, methylprednisolone, triamcinolone, dexamethasone, betamethasone.

Leukotriene receptor antagonists (zafirlukast).

Mechanisms of action of antiallergic agents, comparative characteristics, side effects, application.

Drugs used in anaphylactic shock: epinephrine, GCS, dopamine, salbutamol, antihistamines. Principles of action.

Medicines used for delayed-type allergic reactions

Basic antirheumatic drugs: auranofin, penicillamine, chloroquine, sulfasalazine; and immunosuppressants: cyclosporine, tacrolimus, antilymphocyte immunoglobulins, monoclonal antibody preparations - infliximab, basiliximab; cytotoxic agents - methotrexate.

Immunomodulators

Immunoregulatory peptides – interferon gamma-1 b and other interferons; interferonogens – tiloron, arbidol; thymus preparations – thymogen. Mechanisms of action. Application in medical practice. Immunosuppressive properties of cytostatic agents (antineoplastic agents).

Vitamins and vitamin-like products

Classification, sources of obtaining, pharmacodynamics of vitamin preparations, indications for use and side effects, features of action and comparative characteristics. Causes of hypovitaminosis.

Water-soluble vitamin preparations: thiamine, riboflavin, calcium pantothenate, folic acid, nicotinic acid, pyridoxine, cyanocobalamin, ascorbic acid, rutin, quercetin.

Preparations of fat-soluble vitamins: retinol, ergocalciferol, alphacalcidol, calcitriol, paricalcitol, phytomenadione, tocopherol. Hypervitaminosis during treatment with retinol and ergocalciferol.

Preparations of vitamin-like compounds: choline chloride, calcium pangamate, inosine. Multivitamin and combination preparations with minerals. The concept of antivitamins.

Salts of alkali and alkaline earth metals: sodium chloride, potassium chloride, calcium chloride, magnesium sulfate.

Isotonic, hypertonic and hypotonic sodium chloride solutions. Application. The importance of potassium ions for the function of the nervous and muscular systems. Participation of sodium and potassium ions in the transmission of nerve excitation. Regulation of potassium metabolism. Use of potassium preparations. The effect of calcium ions on the central nervous system, cardiovascular system, cellular permeability. Regulation of calcium metabolism. Use of calcium preparations. Therapeutic use of magnesium preparations. Antagonism between calcium and magnesium ions.

9. Chemotherapeutic agents

9.1. Chemotherapy of infections. Antibiotics

Modern sources of antimicrobial agents. Criteria and basic principles of rational chemotherapy of infections. Principles of combined antibiotic therapy. Possible causes of ineffectiveness of antimicrobial therapy. Principles of antibiotic classification. Basic mechanisms of action of antibiotics. Side effects and complications of antibiotic therapy, their prevention and treatment. Resistance of microorganisms to antibiotics; mechanisms and ways to overcome it.

β-Lactam and other antibiotics that inhibit cell wall synthesis

Penicillins: benzylpenicillin (Na and K salts), benzathine benzylpenicillin (bicillin-1); phenoxymethylpenicillin, oxacillin, amoxicillin, carbenicillin, piperacillin, pivmecillinam; combination drugs based on penicillins with β-lactamase inhibitors - clavulanic acid, sulbactam, tazozyme.

Cephalosporins and cephamycins: cefazolin, cephalexin, cephradine, cefuroxime, cefoxitin, cefotaxime, ceftazidime, ceftriaxone, cefepime. Classification of cephalosporins by spectrum of antimicrobial activity (generations I-IV), resistance to β-lactamases, route of administration.

Carbapenems: imipenem, meropenem, ertapenem.

Monobactams (aztreonam).

Glycopeptides: vancomycin, teicoplanin.

Antibiotics that disrupt the permeability of the cytoplasmic membrane

Polypeptides: polymyxins B, M.

Polyenes: nystatin, amphotericin B.

Antibiotics that inhibit the synthesis of nucleic acids - ansamycins (rifampicin).

Antibiotics that inhibit protein synthesis:

aminoglycosides (aminocyclitols): streptomycin, gentamicin, amikacin, spectinomycin;

tetracyclines: tetracycline, oxytetracycline, doxycycline;

macrolides and azalides: erythromycin, clarithromycin, azithromycin, spiramycin;

amphenicols (chloramphenicol);

lincosamides (clindamycin);

steroid antibiotics (fusidic acid);

oxazolidinones (linezolid);

streptogramins (quinupristin/dalfopristin).

Pharmacodynamics, spectrum of antibacterial action of antibiotics of various groups, indications for use, routes of administration, dosage principles, side and toxic effects.

9.2. Synthetic antimicrobial agents. Antimycobacterial agents

Synthetic antimicrobial agents

Sulfonamides: sulfadimethoxine, sulfalene, phthalylsulfathiazole, sulfacetamide, combinations of sulfonamides with trimethoprim (co-trimoxazole).

Oxyquinolines (nitroxoline).

Nitrofurans: nitrofurantoin, furazolidone.

Quinolones and fluoroquinolones: nalidixic acid, ciprofloxacin, levofloxacin.

Nitroimidazoles (metronidazole, tinidazole).

Pharmacodynamics of synthetic antimicrobial agents, spectrum of antimicrobial action, use, side effects and their prevention.

Antimycobacterial agents

Primary (isoniazid, rifampicin, pyrazinamide, ethambutol, streptomycin) and reserve (cycloserine, kanamycin, clofazimine, bedaquiline, delamanid, fluoroquinolones) drugs for the treatment of tuberculosis. Principles of pharmacotherapy of tuberculosis, the concept of chemoprophylaxis. Antileprosy drugs.

9.3. Antiviral agents. Antifungal agents

Antiviral agents

Anti-influenza drugs: rimantadine/rimantadine, oseltamivir.

Antiherpetic drugs: acyclovir, valacyclovir, idoxuridine, foscarnet.

Medicines for the treatment of HIV infections: maraviroc, zidovudine, nevirapine, raltegravir, saquinavir, enfuvirtide.

Anti-cytomegalovirus agents (ganciclovir).

Drugs for the treatment of respiratory syncytial infection: ribavirin, palivizumab.

Medicines for the treatment of hepatitis C: daclatasvir, dasabuvir, sofosbuvir.

Coronavirus treatment: remdesivir.

Interferons and interferonogens.

Mechanisms of antiviral action, principles of application, side and toxic effects.

Antifungal agents

Amphotericin B, nystatin; griseofulvin, ketoconazole, clotrimazole, fluconazole, itraconazole. terbinafine. Pharmacodynamics, spectrum of antifungal action of antifungal agents, indications, side and toxic effects.

9.4. Antiseptics. Antiprotozoal and antiparasitic agents. Anti-tumor agents

Antiseptics

Differences between antiseptics and chemotherapeutic agents. Requirements for antiseptics. Conditions determining the antimicrobial activity of antiseptics, mechanisms of action. Main groups of antiseptics:

detergents: N-cetylpyridinium chloride, cerigel;

metal compounds: zinc sulfate, copper sulfate;

halogen-containing compounds: chloramine B, alcohol solution of iodine;

acids and alkalis: boric acid, aqueous ammonia solution;

aromatic antiseptics: pure phenol, resorcinol, polycresulen, triclosan, ambazone, biclotymol, hexetidine;

aliphatic antiseptics: ethyl alcohol, formaldehyde solution;

oxidizing agents: potassium permanganate, hydrogen peroxide;

nitrofuran derivatives (furacilin);

dyes: methylene blue, brilliant green;

biguanides (chlorhexidine);

imidazole antiseptics (metronidazole);

quaternary ammonium compounds: benzalkonium chloride, miramistin.

Features of the use of individual antiseptics. Principles of treatment of acute poisoning with antiseptics.

Antiprotozoal agents

Antimalarial drugs: artemether, chloroquine, mefloquine, quinine, pyrimethamine, primaquine.

Antiamoebic agents: metronidazole, tinidazole.

Medicines used for trichomoniasis: metronidazole, tinidazole.

Drugs used for giardiasis (lambliasis): metronidazole, tinidazole, mepacrine.

Drugs used for toxoplasmosis: pyrimethamine in combination with sulfonamides (sulfadiazine, sulfadimidine) and antibiotics (clindamycin, azithromycin).

Drugs used for leishmaniasis: sodium stibogluconate, pentamidine isethionate, mepacrine.

Principles of chemotherapy of protozoal infections, mechanisms of action of antiprotozoal agents, application, side effects. The concept of individual and public chemoprophylaxis of malaria.

Antiparasitic (anthelmintic) agents (mebendazole, pyrantel, albendazole, levamisole, praziquantel, niclosamide): mechanisms of action, principles of application, side effects. Agents used for intestinal nematodosis, cestodosis and trematodosis: properties, application features, side effects. General characteristics of agents used for extraintestinal helminthiasis.

Anti-tumor agents

Principles of chemotherapy of malignant neoplasms, mechanisms of action of antitumor agents. Peculiarities of antitumor action of alkylating agents, antimetabolites, platinum preparations, antibiotics, hormonal preparations and antagonists of hormones, enzymes. Complications of tumor chemotherapy, their prevention.

10. Drugs used in dentistry

10.1. Agents regulating metabolism in hard dental tissues

Calcium, phosphorus, fluorine preparations:

calcium preparations: calcium chloride, calcium gluconate, calcium lactate, calcium hydroxide;

phosphorus preparations: calcium glycerophosphate, phytin;

fluoride preparations: sodium fluoride, sodium monofluorophosphate, stannous fluoride, olaflur, dectaflur, fluorolac; methods for indicating fluoride concentration in medical products;

combined calcium and phosphorus preparations – osteogenon.

Hormonal agents. Thyroid and parathyroid gland preparations: teriparatide; glucocorticosteroids; vitamin D preparations (ergocalciferol, alphacalcidol, calcitriol, paricalcitol); sex hormone preparations – estrogens, androgens; anabolic steroids.

Indications, side effects, contraindications for the use of agents that regulate metabolism in hard dental tissues.

10.2. Agents used to affect the oral mucosa and dental pulp

Anti-inflammatory drugs

Astringents: tannin, sage leaf, chamomile flowers, romazulan, oak bark;

Enzyme preparations: trypsin, chymotrypsin, ribonuclease, deoxyribonuclease, lidase;

GCS: hydrocortisone (mucoadhesive buccal tablets), beclomethasone (spray), betamethasone (soluble tablets), systemic GCS; hydrocortisone ointment, prednisolone, flumethasone pivalate (locacorten), fluocinolone acetonide (sinaflan);

NSAIDs: flurbiprofen (lozenges), choline salicylate + cetyl alcohol chloride (gel), diclofenac (mouthwash); phenylbutazone (butadione) ointment, indomethacin ointment, mephenamine sodium salt;

Other agents with anti-inflammatory action: benzydamine (spray, mouthwash), dimethyl sulfoxide, heparin ointment.

Antibacterial drugs and antiseptics: doxycycline (soluble tablets), biclotymol, cetylpyridinium chloride; chlorhexidine, chlorhexidine + ascorbic acid, chlorhexidine

+ metronidazole; povidone-iodine + allantoin, hexetidine, doritricin, grammidin, ingalipt;

Antiviral agents: oxolin, bonafton, tebrofen, acyclovir, valacyclovir, famciclovir, butaminofen.

Antifungal agents: nystatin, miconazole, fluconazole.

Agents stimulating tissue regeneration: vitamins A, E; sea buckthorn and rosehip oil, carotolin, Shostakovsky balm, methylthiouracil ointment, propolis, actovegin, solcoseryl.

Pain suppressants: local action: local anesthetics, astringents, enveloping agents; resorptive action: non-narcotic analgesics (paracetamol, ibuprofen, metamizole).

Products used to eliminate bad breath (deodorizing): peppermint oil, menthol, metronidazole (rinses).

Xerostomia treatment agents : saliva secretion stimulants: reflex action - ascorbic acid, nicotinic acid, citric acid, malic acid; cholinomimetics and anticholinesterase agents - pilocarpine, cevimeline, bethanechol, neostigmine, pyridostigmine, physostigmine; yohimbine (antagonist of presynaptic α_2 receptors of parasympathetic branches of cranial nerves); saliva substitutes and lubricants: isotonic sodium chloride solution; calcium phosphate; mucin-based products; xylitol or carboxymethylcellulose-based products; oxygenated triacylglycerol (OGT) lubricants; products containing salivary enzymes (lactoperoxidase, lactoferrin, lysozyme, glucose oxidase).

Agents that reduce salivary secretion: anticholinergics – atropine, tricyclic antidepressants, phenothiazine neuroleptics, first-generation antihistamines – diphenhydramine, adrenergic and sympathomimetics.

11. Drug interactions. Pharmacogenetics

Combined administration of drugs. Use of combined drugs in modern pharmacotherapy. Indications for combination therapy. Types and mechanisms of drug interactions. Possible results of drug interactions. Pharmaceutical and pharmacological incompatibility. Polypharmacy. Concept of pharmacogenetics, influence of gene polymorphism on pharmacokinetics and pharmacodynamics of drugs.

12. Principles of treatment of acute drug poisoning

Classification of pharmacological substances by toxicity and hazard (lists A, B). Principles of treating poisoning with pharmacological substances. First aid. Assistance measures depending on the route of entry of substances into the human body. Main groups of antidotes: toxicotropic antidotes, toxicokinetic antidotes, pharmacological antagonists, immunological antidotes (antitoxic serums). Mechanism of action of antidotal agents. Conditions and limitations for their use. Prevention of acute poisoning with drugs.

EDUCATIONAL AND METHODOLOGICAL CARD OF THE ACADEMIC DISCIPLINE «PHARMACOLOGY»

Section, topic #	Section (topic) name	Number of class hours		Supervised student independent work	Literature	Practical skill	Forms of control	
		lectures	practical				of practical skills	of current / intermediate assessment
4th semester								
	Lectures	**9**	**-**	**3**				
1.	Pharmacokinetics of drugs	1,5	-	-	6, 7			
2.	Pharmacodynamics of drugs	1,5	-	-	6, 7			
3.	Cholinergic drugs	1,5	-	-	6, 7			
4.	Agents affecting afferent transmission of nerve impulses	-	-	1,5	6, 7			Testing; discussion of abstracts
5.	Analgesics	-	-	1,5	6, 7			Control work; discussion of abstracts
6.	Psychotropic drugs	1,5	-	-	6, 7			
7.	Drugs affecting the cardiovascular system and renal function	1,5	-	-	6, 7			
8.	Anti-inflammatory drugs	1,5	-	-	6, 7			
	Practical classes	-	**36**	-				
1. 2.	Introduction to the academic discipline «Pharmacology». Rules for issuing doctor's prescriptions when prescribing medicines in various dosage forms	-	2	-	1, 2, 3, 4, 5, 7	Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Writing out a doctor's prescription	Checking written doctor's prescriptions
2.	Liquid dosage forms	-	2	-	1, 2, 3, 4, 5, 7	Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Writing out a doctor's prescription	Checking written doctor's prescriptions

2.	Injectable dosage forms. Soft dosage forms	-	2	-	1, 2, 3, 4, 5, 7	Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Writing out a doctor's prescription	Checking written doctor's prescriptions
3.	Pharmacokinetics of drugs	-	2	-	3, 4, 5, 6, 7			Control work; testing
4.	Pharmacodynamics of drugs	-	2	-	3, 4, 5, 6 7			Control work; testing
3.	Final lesson on the topic: «General prescription. General pharmacology»	-	2	-	1, 2, 3, 4, 5, 6, 7	Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Writing out a doctor's prescription*	Written control work *
5.1.	Cholinergic drugs	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Control work; checking written doctor's prescriptions
5.1.	Anticholinergic drugs	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Control work; checking written doctor's prescriptions

5.2.	Adrenergic drugs	-	2	-	1, 2, 3, 4, 5, 6, 7	Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases	Solving a situational problem	Control work; checking written doctor's prescriptions
5.3.	Antiadrenergic drugs. Drugs affecting afferent transmission of nerve impulses	-	2	-	1, 2, 3, 4, 5, 6, 7	Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Writing out a doctor's prescription	Control work; checking written doctor's prescriptions
5.2.	Final lesson on the topic: «Agents affecting the peripheral nervous system»	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem* Writing out a doctor's prescription*	Written control work *
6.1.	General anesthetics. Ethyl alcohol	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview

6.2.	Analgesics	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview
6.3.	Anticonvulsants and antiparkinsonian drugs	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview
6.4.	Psychotropic drugs	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview

6.4.	Final lesson on the topic «Drugs affecting the central nervous system»	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor's prescription for medications in various dosage forms	Solving a situational problem* Writing out a doctor's prescription*	Written control work *
7.1.	Drugs affecting respiratory function	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor's prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview
7.2.	Drugs affecting the functions of the digestive organs. Agents affecting the tone and contractile activity of the myometrium	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor's prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview

	5th semester							
	Lectures	**6**	**-**	**3**				
1.	Antiallergic agents and immunomodulators	1,5	-	-	6, 7			
2.	Chemotherapeutic agents. Antibiotics	1,5	-	-	6, 7			
3.	Synthetic antimicrobial agents. Antimycobacterial agents	1,5	-	-	6, 7			
4.	Antiviral agents, antifungal agents	1,5	-	-	6, 7			
5.	Agents that regulate metabolism in hard dental tissues	-	-	1,5	6, 7			Testing; discussion of abstracts
6.	Agents used to affect the oral mucosa and dental pulp	-	-	1,5	6, 7			Control work; discussion of abstracts
	Practical classes	-	**36**	-				
7.3.	Drugs affecting the blood system	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview
7.4.	Drugs affecting the cardiovascular system and renal function. Diuretics. Antihypertensive drugs	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview

						medications in various dosage forms		
7.4.	Antianginal and lipid-lowering agents	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor's prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview
7.4.	Drugs for the treatment of heart failure. Antiarrhythmic drugs	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor's prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview
7.4.	Final lesson on the topic «Drugs affecting the cardiovascular system and renal function»	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor's prescription for medications in various dosage forms	Solving a situational problem* Writing out a doctor's prescription*	Written control work *

8.1.	Hormonal and antihormonal agents	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview
8.2.	Anti-inflammatory drugs	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview
8.3.	Antiallergic agents and immunomodulators. Vitamins and vitamin-like agents. Salts of alkaline and alkaline earth metals	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview

9.1.	Chemotherapeutic agents. Antibiotics that inhibit cell wall synthesis	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview
9.2.	Antibiotics that disrupt the permeability of the cytoplasmic membrane, inhibiting the synthesis of nucleic acids and proteins	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview
9.2.	Synthetic antimicrobial agents. Antimycobacterial agents	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview

9.3.	Antiviral agents, antifungal agents	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview
9.4.	Antiseptic and disinfectant agents. Antiprotozoal and antiparasitic agents	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview
9.1.	Final lesson on the topic: «Chemotherapeutic agents»	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem* Writing out a doctor's prescription*	Written control work *

10.1.	Agents that regulate metabolism in hard dental tissues	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; testing; interview
10.2.	Agents used to affect the oral mucosa and dental pulp	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; interview
11.	Drug interactions. Pharmacogenetics	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Checking written doctor's prescriptions; interview

12.	Principles of treatment of acute drug poisoning	-	2	-	1, 2, 3, 4, 5, 6, 7	1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases. 2. Prescribing and filling out a doctor's prescription for medications in various dosage forms	Solving a situational problem Writing out a doctor's prescription	Testing; interview
	Total hours	**15**	**72**	**6**				Examination

* is a mandatory form of current certification (the form of control for which each student will receive a mark is marked)

INFORMATION AND INSTRUCTIONAL UNIT

LITERATURE

Basic (relevant):

1. Alyautdin, R. N. Pharmacology. Illustrated textbook / R. N. Alyautdin. – Moscow : Geotar-Media, 2022. – 312 p.

Additional:

2. Kharkevitch, D. A. Pharmacology : textbook for medical students / Kharkevitch D. A. – 2nd ed., rev.and suppl. – Moscow : GEOTAR-Media Publishihg Group, 2017. – 680 p.

3. Katzung, B. G. Basic and Clinical Pharmacology / B. G. Katzung, A. J. Trevor. – 14th ed. – New York : McGraw-Hill Medical, 2021. – 1264 p.

4. Trevor, A. G. Katzung & Trevor's Pharmacology Examination and Board Review / A. G. Trevor, B. G. Katzung, M. Knuidering-Hall. – New York : McGraw-Hill Medical, 2019. – 592 p.

5. Brunton, L. L. Goodman & Gilman's The Pharmacological basis of Therapeutics / L. L. Brunton, B. Knollman, R. Hilal-Dandan. – 13th ed. – McGraw-Hill, 2017. – 1440 p.

6. Vauchok, A. V. Pharmacology : tests for the specialty «Dentistry» / A. Vauchok, N. Bizunok, B. Dubovik, A. Shalukhina. – Minsk : BSMU, 2019. – 108 p.

Electronic courseware for the educational discipline «Pharmacology»:

7. https://etest.bsmu.by/course/view.php?id=228.

METHODOLOGICAL RECOMMENDATIONS FOR THE ORGANIZATION AND PERFORMANCE OF STUDENT INDEPENDENT WORK IN THE ACADEMIC DISCIPLINE

The time allocated for independent work can be used by students to:

preparation for lectures and practical classes;

preparation for control works and exams in the academic discipline;

elaboration of topics (questions) submitted for independent study;

studying topics and problems that are not covered in lectures and practical classes;

problem solving;

preparation of thematic reports, abstracts, presentations;

performing practical tasks.

METHODOLOGICAL RECOMMENDATIONS FOR THE ORGANIZATION AND PERFORMANCE OF SUPERVISED STUDENT INDEPENDENT WORK IN THE ACADEMIC DISCIPLINE

APPROXIMATE LIST OF TASKS FOR SUPERVISED STUDENT INDEPENDENT WORK:

writing and presentation of an abstract;

presentation of a report;

study of topics and problems that are not covered in lectures;

taking notes from primary sources (sections of anthologies, collections of documents, monographs, textbooks);

computer testing.

FORMS OF CONTROL OF GUIDED INDEPENDENT WORK:

testing;
control work;
discussion of abstracts.

LIST OF AVAILABLE DIAGNOSTIC TOOLS

The following forms are used to diagnose competencies:
control work;
written control work;
checking written doctor's prescriptions;
testing;
interview.

LIST OF AVAILABLE TEACHING METHODS

Traditional method;
Active (interactive) methods:
Problem-Based Learning (PBL);
Case-Based Learning (CBL);
Research-Based Learning (RBL).

LIST OF PRACTICAL SKILLS

Name of practical skill	Form of practical skills control
1. Selection of the method of administration of the drug, its dosage regimen based on the pharmacokinetic data of the drug and the goals of pharmacotherapy in accordance with clinical protocols for the treatment of dental diseases	Solving a situational problem
2. Prescribing and filling out a doctor’s prescription for medications in various dosage forms	Writing out a doctor's prescription*

* List of medications offered for prescription during the exam:

1. Acetylsalicylic acid - tablets, effervescent tablets;
2. Acyclovir - ointment, cream, suspension, tablets;
3. Alfacalcidol - capsules;
4. Amoxicillin - capsules, powder, suspension for oral administration;
5. Articaine + epinephrine (ubistesin forte) - injection solution;
6. Azithromycin - tablets, capsules;
7. Beclomethasone - aerosol for inhalation;
8. Benzydamine - solution for topical use, spray;
9. Betamethasone - tablets, injection suspension;
10. Bisoprolol - tablets;
11. Bupivacaine - injection solution;

12. Calcitonin - injection solution;
13. Calcitriol - capsules;
14. Calcium gluconate - injection solution, tablets;
15. Carbamazepine - tablets;
16. Cefuroxime axetil - film-coated tablets;
17. Cephalexin - capsules, tablets, dispersible tablets, suspension for oral administration, granules for suspensions;
18. Cephradine - capsules;
19. Cetirizine - tablets, capsules, solution for oral administration;
20. Clarithromycin - tablets, suspension for oral administration;
21. Clindamycin - capsules;
22. Co-amoxiclav - tablets, suspension for oral administration;
23. Diazepam - tablets;
24. Diclofenac - tablets, rectal suppositories, injection solution, ointment;
25. Dihydrocodeine - tablets;
26. Diphenhydramine - tablets, injection solution;
27. Doxycycline - tablets, capsules, powder for solution for infusions in vials;
28. Epinephrine - injection solution;
29. Erythromycin - tablets, ointment;
30. Fluconazole - capsules;
31. Hydrocortisone - injection solution, ointment, cream, tablets;
32. Ibuprofen - tablets, ointment, suspension for oral administration;
33. Lansoprazole - capsules;
34. Lidocaine - injection solution, spray, ointment;
35. Loratadine - tablets, syrup;
36. Metronidazole - tablets, gel, solution for infusions;
37. Miconazole - gel, vaginal suppositories, vaginal capsules;
38. Miramistin - solution for local use in bottles, ointment;
39. Neostigmine - injection solution;
40. Nystatin - tablets, suspension for oral administration;
41. Omeprazole - capsules;
42. Oxytetracycline - tablets;
43. Paracetamol - tablets, effervescent tablets, oral suspension, suppositories for children;
44. Phenoxymethylpenicillin - tablets;
45. Prednisolone - injection solution, tablets;
46. Procaine - injection solution;
47. Promethazine - injection solution;
48. Sodium fluoride - tablets;
49. Temazepam - tablets;
50. Tetracycline – tablets.

PROTOCOL OF CURRICULUM APPROVAL

Name of the academic discipline that requires approval	Name of the department	Proposals for changes in the content of the curriculum of an institution of higher education in an academic discipline	The decision taken by the department that developed the curriculum (indicating the date and protocol number)
1. Internal Diseases	Propaedeutics of Internal Diseases	No offers	Protocol # 1 of 28.08.2024
2. Pediatrics	Propaedeutics of Childhood Diseases	No offers	Protocol # 1 of 28.08.2024
3. Psychiatry and Narcology	Psychiatry, Narcology, Psychotherapy and Medical Psychology with a course of retraining and advanced training	No offers	Protocol # 1 of 28.08.2024
4. Infectious Diseases	Infectious Diseases with a course of retraining and advanced training	No offers	Protocol # 1 of 28.08.2024
5. Neurology and Neurosurgery	Nervous and Neurosurgical Diseases	No offers	Protocol # 1 of 28.08.2024
6. Forensic Medicine	Pathological Anatomy and Forensic Medicine with a course of retraining and advanced training	No offers	Protocol # 1 of 28.08.2024
7. Dermatovenerology	Dermatovenereology and Cosmetology with a course of retraining and advanced training	No offers	Protocol # 1 of 28.08.2024
8. Clinical Pharmacology	Clinical Pharmacology	No offers	Protocol # 1 of 28.08.2024
9. Surgical Diseases	General Surgery	No offers	Protocol # 1 of 28.08.2024
10. Ophthalmology	Eye Diseases	No offers	Protocol # 1 of 28.08.2024
11. Traumatology and Orthopedics	Traumatology and Orthopedics with a course of retraining and advanced training	No offers	Protocol # 1 of 28.08.2024
12. Obstetrics and Gynecology	Obstetrics and Gynecology with a course of retraining and advanced training	No offers	Protocol # 1 of 28.08.2024
13. Otorhinolaryngology	Otorhinolaryngology with a course of retraining and advanced training	No offers	Protocol # 1 of 28.08.2024
14. Conservative Dentistry	Conservative Dentistry	No offers	Protocol # 1 of 28.08.2024
15. Endodontics	Endodontics	No offers	Protocol # 1 of 28.08.2024

16. Disease of the Oral Mucosa	Periodontology	No offers	Protocol # 1 of 28.08.2024
17. Clinical Periodontology	Periodontology	No offers	Protocol # 1 of 28.08.2024
18. Complex Periodontology	Periodontology	No offers	Protocol # 1 of 28.08.2024
19. Oral Surgery and Propaedeutics of Maxillofacial Surgery	Surgical Dentistry	No offers	Protocol # 1 of 28.08.2024
20. Maxillofacial Surgery and Outpatient Maxillofacial Surgery	Maxillofacial Surgery and Facial Plastic Surgery with a course of retraining and advanced training	No offers	Protocol # 1 of 28.08.2024
21. Therapeutic Pediatric Dentistry	Pediatric Dentistry	No offers	Protocol # 1 of 28.08.2024
22. Oral and Maxillofacial Pediatric Surgery	Pediatric Dentistry	No offers	Protocol # 1 of 28.08.2024

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Curriculum content, composition and the accompanying documents comply with the established requirements.

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